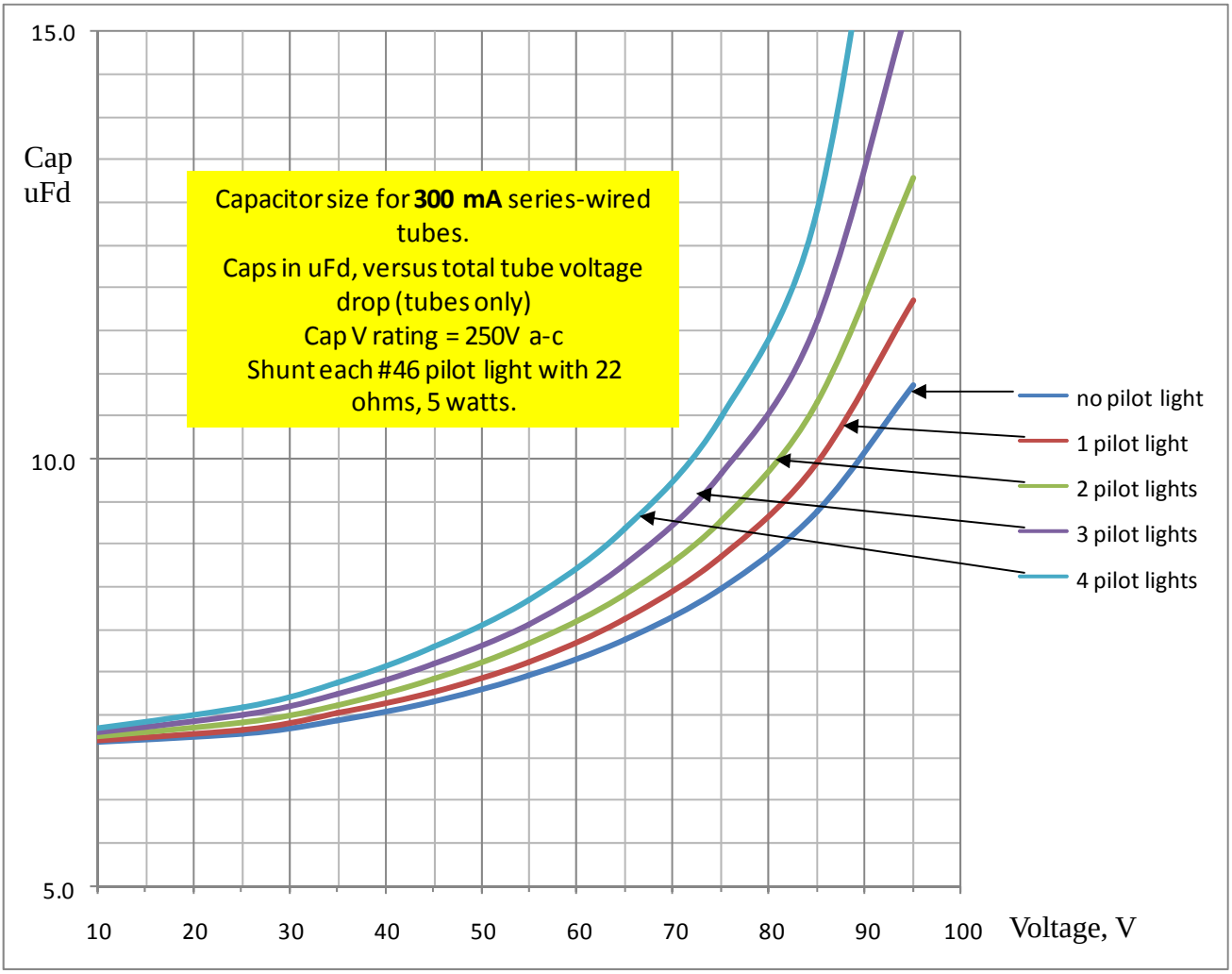
Ed's HANDY HINTS and KINKS

By Ed Lyon

Several MAARC members recalled the day when Charlie Rhodes made some kind of subtle gaff in recommending the use of 1N4007 diodes as replacements for practically all power-cord resistance elements and /or ballast tubes in the older ac-dc radios we collectors have. He got corrected by a couple members whose math skills were quicker than Charlies, so he went home and devised a "far better" way to do away with defective and crispy power line resistance cords and charred ballasts, and that was to use capacitors as replacements. He gave us the math equations to use to compute the capacitor values needed, but they were mostly Greek (snort!), so the MAARC members who recalled Charlie also asked if I could make up a simple chart of capacitor values.

Below is such a chart. But first, why use capacitors in lieu of the resistors of old? Answer: because capacitors, unlike resistance elements, do not produce heat, and capacitors have the same value at start-up as when in full operation. Now for the chart. This page shows the plot of capacitor values, in microfarads (vertical) versus the total tube voltage rating, in series. Here you just add up the tubes' heater voltage ratings. For a 25Z5, 25L6, 6A7, 6K7, and 6Q7 radio, for example the voltages add to 69 volts (rounded to the nearest volt). If the radio had no pilot lamp or even a single pilot lamp, the capacitor to use in place of the power cord resistance is 8 uFd, a-c rated at 250 volts. This will not be an electrolytic capacitor, but a modern metallized film- type. I picked some in various sizes the last hamfest I went to, maybe last March or April. The pilot light will need special treatment. For 300 mA tube strings, you should use a type 51 bulb (if the socket is bayonet type, or type 46 if the socket takes screw-in bulbs. Now you also have to add a shunt resistor across the bulb terminals to make the bulb last longer. 47 ohms, at 5 watts will run cool until the bulb does fail, after which it will run warmer, but not dangerously so.



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For those more rare cases where there is a 150 mA tube string, like 35L6, 35Z5, 12 SA7, etc, etc., there is a similar chart on this page. Difference here is that you would use type 47 bulbs practically all the time, but in a few radios, screw-type bulbs are called for, which means you use type 40 bulbs, and now, with all bulbs in 150 mA tube strings, you shunt the bulb terminals with a 22 ohm, 2-watt resistor.

.The actual capacitance velue is not really critical, but if you deviate from the plot values, you should use a slightly lower capacitance rather than be generous. Good news is that these capacitors do not heat up in operation, unlike resistors. Let me emphasize that you should not use electrolytic capacitors here. They are way, way loose in value and do not behave in a civil manner in a-c operation. Some people use them in an opposing-polarity series chain, and claim success, but the capacitance value is a very loose thing. Get the metallized-film type rated at 250 V a-c, and You'll be just fine.

But Charlie's stumble came when he suggested using 1N4007 diodes to replace resistors. This is a dandy idea, and works fine for those who are cramped for space in the chassis. But they need to be combined with a resistance, and seldom work out to be sufficient alone. Best rule of thumb is this: The diode admits only one polarity of the a-c waveform. Thus it removes power each opposing half cycle of the a-c input. Best way to approximate how it behaves is to imagine the diode as removing 35 volts' worth of the incoming power-line voltage. So if your series string adds up to 69 volts as on the previous page example, and the power line is 120 volts, adding the diode in series with the power line in effect removes 35 volts of the applied voltage. Now, effectively, 85 volts is now applied to the heater string. Since it needs 69 volts, we still have to dissipate (85 - 69), or 16 volts of a-c. At 300 mA heater current that means we add, also in series, 16/0.3, or 53.3 ohms (use 50 ohms), which will dissipate 4.5 watts, so use a 10W resistor.